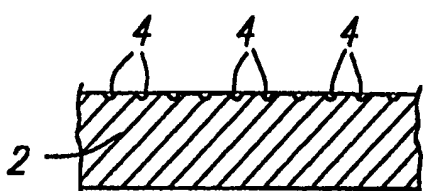


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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/GB98/03764 <b>(22) International Filing Date:</b> 15 December 1998 (15.12.98)  <b>(30) Priority Data:</b> 9726600.1 18 December 1997 (18.12.97) GB  <b>(71) Applicant (for all designated States except US):</b> LINPAC PLASTICS LIMITED [GB/GB]; A1 Business Park, Knottingley, West Yorkshire WF11 0BS (GB).  <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> SALTER, Saul La Roche [GB/GB]; Manor Farm House, Thorpe Audlin, Pontefract, West Yorkshire WF8 3HD (GB).  <b>(74) Agent:</b> WATSON, Anthony, Stephen; 2 Lea Croft, Clifford, Wetherby, West Yorkshire LS23 6EY (GB).		<b>(81) Designated States:</b> AU, BR, CA, JP, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i>
<b>(54) Title: PACKAGING MATERIALS AND PACKAGING TRAYS</b>  <b>(57) Abstract</b> <p>A packaging material and a packaging tray (26) formed therefrom, said packaging material consisting of or including a layer of absorbent plastics material having surface perforations or through perforations therein. Said absorbent plastics material will be an expanded polystyrene foam of open or closed cell construction and having a core density of 30 to 150 kg/m<sup>2</sup>. The packaging material may be in the form of a laminate consisting of an upper layer (12) of open cell expanded polystyrene and a lower layer (14) of closed cell expanded polystyrene. The packaging material may be provided with a surface layer of film (18) which is predominantly polystyrene based and which has through perforations therein.</p> 		

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PACKAGING MATERIALS AND PACKAGING TRAYS

This invention relates to packaging materials and more particularly to such materials for use in the packaging of fruit, more specifically  
05 apples and grapes.

Presently used packaging trays, which expression shall include separators and collation trays, for apples and grapes are formed of an expanded polystyrene material, such trays being planar or being  
10 provided with recesses in which the fruit sits. Even with this material, the fruit packaged - sandwiched - between these trays in an outer box often becomes damaged due to inadequate drainage or inadequate absorbency of the trays, resulting in the fruit lying in water on the tray or in the recesses in the tray.

15

The present invention therefore seeks to provide an improved form of packaging material and packaging trays formed therefrom, particularly for use in the packaging and transportation of apples and grapes.

20 According to one aspect of the present invention there is provided a

- 2 -

packaging material consisting of or including a layer of absorbent  
plastics material having surface perforations or through perforations  
05 therein.

Said plastics material will preferably be expanded polystyrene foam  
and may be of open cell or closed cell construction having a core  
density of 30 to 150kg/m<sup>2</sup>.

10

Said packaging material may consist of a laminate comprising an upper  
layer of open cell expanded polystyrene foam and a lower layer of  
closed cell expanded polystyrene foam, and said upper layer may have  
on its upper surface a layer of film, which will be predominantly poly-  
15 styrene based.

According to a second aspect of the present invention there is provided  
a packaging tray comprising or including a layer of absorbent plastics  
material, said tray being substantially planar or having recesses therein  
20 and being provided with surface or through perforations.

- 3 -

In order that the invention may be more readily understood,  
embodiments thereof will now be described, by way of example,  
05 reference being made to the accompanying diagrammatic drawings  
wherein:

Figure 1 is a cross-section through a packaging material in accordance  
with the invention;

Figure 2 shows in cross-section a modification of the packaging  
10 material of Figure 1;

Figures 3 and 4 are cross-sections showing respectively modifications  
to the packaging materials of Figures 1 and 2;

Figure 5 is a cross-section through a packaging material in accordance  
with an alternative embodiment of the invention;

15 Figure 6 shows in cross-section a modification of the packaging  
material of Figure 5;

Figure 7 shows in cross-section a modification of the packaging  
material of Figure 6;

Figure 8 shows in cross-section a further modification of the packaging  
20 material of Figure 5;

- 4 -

Figures 9 and 10 are cross-sections showing respectively modifications of the packaging materials of Figures 6 and 7; and

05 Figure 11 is a cross-sectional elevation through a packaging tray.

Referring to the drawings and firstly to Figure 1, the packaging material comprises a layer 2 of absorbent plastics material having a plurality of perforations 4 in its upper surface. The layer 2 is formed of  
10 expanded polystyrene foam of at least partly open cell construction and has a core density of 30 to 150kg/m<sup>2</sup> and a thickness of 1.5 to 6.0mm. The surface perforations may be formed during the formation of the material or they may be applied in a post-forming operation.

15 Figure 2 shows a modification to the packaging material of Figure 1 in that the layer 2 - of the same construction as described with reference to Figure 1 - has through perforations 6 which extend from one surface to the other of the material.

20 Figures 3 and 4 show variations or modifications to the packaging

- 5 -

materials of Figure 1 in that a surface layer or coating 8 is applied to the surface of the layer 2 so as to form a laminate. In the case of the packaging material of Figure 3, the surface layer or coating 8 has through perforations 10 which communicate with the layer 2, whilst in Figure 4 the packaging material has through perforations 6A which extend from one surface of the laminate to the other. The surface layer or coating 8 is a predominantly polystyrene based film having a thickness of 15 to 150 microns.

Referring now to Figure 5, the packaging material consists of a laminated structure comprising an upper layer 12 of open cell expanded polystyrene foam having the same characteristics as the layer 2 in Figures 1 to 4, and a lower layer 14 of closed cell expanded polystyrene foam. The laminate formed by the layers 12 and 14 has an overall thickness of 1.5 to 6.0mm, and the upper layer 12 is provided with surface perforations 16.

Figure 6 shows the packaging material of Figure 5 but with

- 6 -

perforations 16A extending throughout the thickness of the layer 12 so  
as to communicate with the layer 14, and Figure 7 shows perforations  
05 16B extending through both of the layers 12 and 14.

Figures 8 to 10 show modifications to the laminated packaging  
materials of Figures 5 to 7 in that a surface layer or coating 18 - having  
the same characteristics as the surface layer or coating 8 previously  
10 referred to - has been applied to the outer surface of the layer 12. In  
Figure 8, the perforations 20 are through perforations such that they  
communicate with the layer 12, whilst in Figure 9 the perforations 22  
extend through the layer 12 to communicate with the layer 14. In  
Figure 10, the perforations extend through the whole laminated  
15 structure.

The surface layers or coatings 8 and 18 are solid and are provided to  
add a degree of rigidity to the packaging material.

20 Packaging materials as described above may be formed into packaging



- 7 -

- trays - separation or collation trays - for the packaging and transportation of fruit, particularly apples and grapes. The packaging
- 05 trays formed of the material in accordance with the invention may be substantially planar, or they may be provided or formed with recesses to accommodate single articles of fruit such as apples or discrete bunches of grapes.
- 10 The presence of the perforations, either surface perforations or through perforations, enables liquid to be absorbed into the material and/or to pass through the material, such that the fruit is not lying in the liquid and hence preventing the fruit from becoming water-logged and damaged.

15

20

- 8 -

CLAIMS:

- 05 1. A packaging material consisting of or including a layer of  
absorbent plastics material having surface perforations or through  
perforations therein.
2. A packaging material according to Claim 1, wherein said plastics  
10 material is expanded polystyrene foam.
3. A packaging material according to Claim 2, wherein said  
expanded polystyrene foam has a core density of 30 to 150kg/m<sup>2</sup>.
- 15 4. A packaging material according to Claim 2 or Claim 3, wherein  
said expanded polystyrene foam is of open cell or closed cell  
construction.
5. A packaging material according to any of Claims 1 to 4, wherein  
20 said packaging material has on its upper surface a layer of film, said

- 9 -

film being predominantly polystyrene based and having through perforations therein.

05

6. A packaging material according to any of Claims 1 to 4, wherein said packaging material consists of a laminate comprising an upper layer of open cell expanded polystyrene foam and a lower layer of closed cell expanded polystyrene foam.

10

7. A packaging material according to Claim 6, wherein said upper layer has on its upper surface a layer of film which is predominantly polystyrene based and which has through perforations therein.

15

8. A packaging tray comprising or including a layer of absorbent plastics material, said tray being substantially planar or having recesses therein and being provided with surface or through perforations.

9. A packaging tray composed of any of the packaging materials

20

according to Claims 1 to 7.

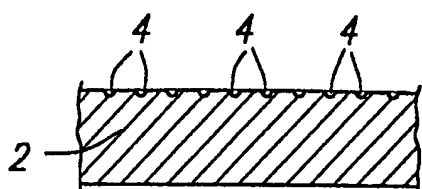


FIG. 1

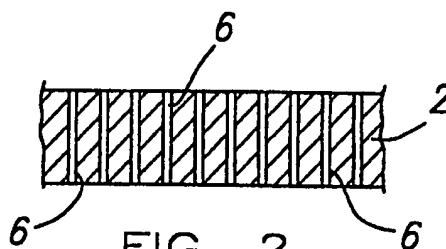


FIG. 2

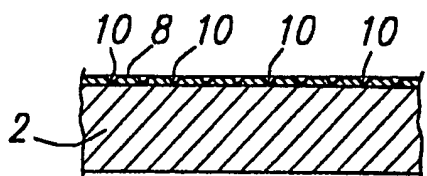


FIG. 3

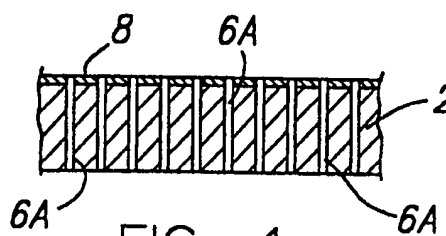


FIG. 4

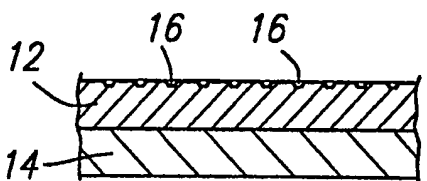


FIG. 5

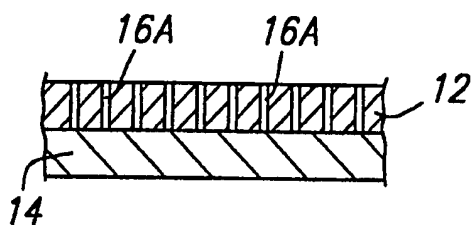


FIG. 6

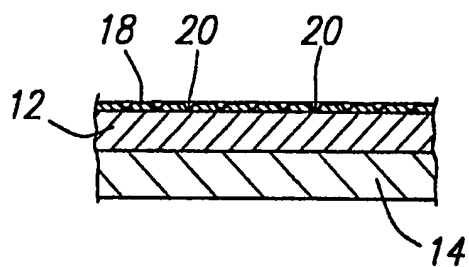


FIG. 7

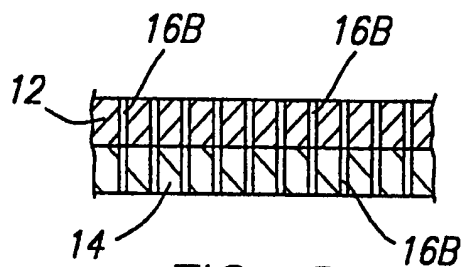


FIG. 8

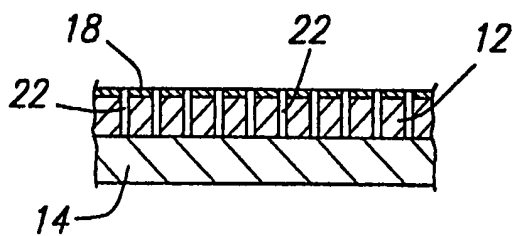


FIG. 9

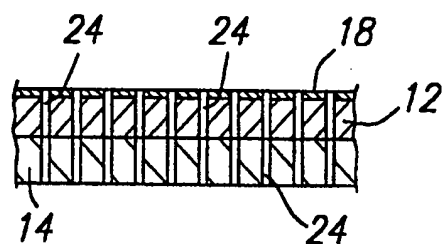
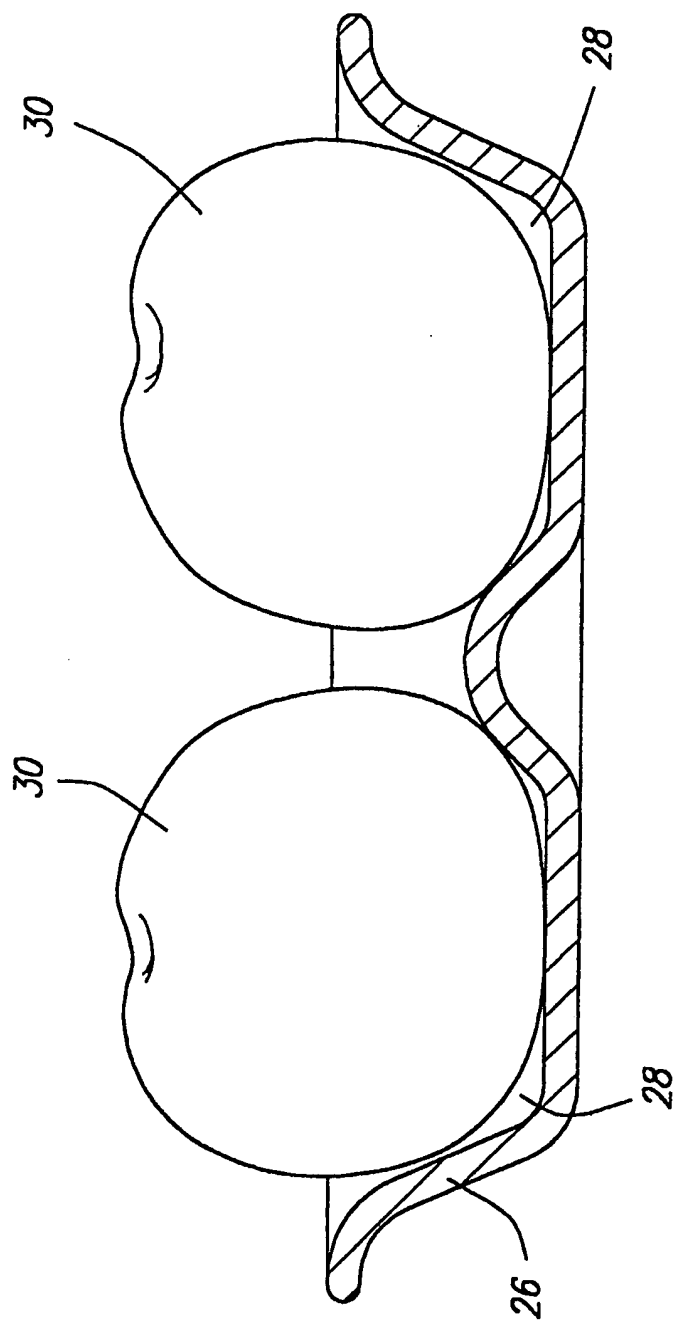


FIG. 10



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 98/03764

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 B65D81/26

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

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IPC 6 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	EP 0 849 309 A (SIRAP GEMA SPA) 24 June 1998 see column 6, line 1 - column 7, line 6; figures; examples ---	1-9
X	EP 0 754 632 A (SIRAP GEMA SPA) 22 January 1997 see column 4, line 8 - column 5, line 8; figures; examples ---	1-9
A	EP 0 743 262 A (SIRAP GEMA SPA) 20 November 1996 see column 3, line 14 - column 5, line 34; figures ---	1-9
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A	US 5 639 145 A (ALDERMAN WILLIS H) 17 June 1997 see column 1, line 41 - line 58; figure 1 ---	1-9
A	EP 0 046 956 A (HOECHST AG) 10 March 1982 see page 12, line 25 - page 13, line 21; figures -----	1-9

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Information on patent family members

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0849309	A	24-06-1998	PL 323815 A	22-06-1998
EP 0754632	A	22-01-1997	IT MI951541 A	17-01-1997
			AT 171914 T	15-10-1998
			DE 69600752 D	12-11-1998
			ES 2124619 T	01-02-1999
			PL 315316 A	20-01-1997
			US 5833894 A	10-11-1998
EP 0743262	A	20-11-1996	IT MI951024 A,B	19-11-1996
			US 5720999 A	24-02-1998
			AT 172430 T	15-11-1998
			DE 69600820 D	26-11-1998
			ES 2124618 T	01-02-1999
			PL 312976 A	25-11-1996
US 4702377	A	27-10-1987	DE 3442341 A	22-05-1986
			AT 65231 T	15-08-1991
			CA 1263631 A	05-12-1989
			DK 535685 A,B,	21-05-1986
			EP 0182139 A	28-05-1986
			IE 57109 B	22-04-1992
			US RE33143 E	09-01-1990
US 5639145	A	17-06-1997	NONE	
EP 0046956	A	10-03-1982	DE 3032810 A	15-04-1982